

Epitomes

Important Advances in Clinical Medicine

Emergency Medicine

The Scientific Board of the California Medical Association presents the following inventory of items of progress in emergency medicine. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist the busy practitioner, student, research worker or scholar to stay abreast of these items of progress in emergency medicine that have recently achieved a substantial degree of authoritative acceptance, whether in his own field of special interest or another.

The items of progress listed below were selected by the Advisory Panel to the Section on Emergency Medicine of the California Medical Association and the summaries were prepared under its direction.

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Verapamil and Supraventricular Tachycardia

VERAPAMIL, a calcium channel blocking agent recently approved by the Food and Drug Administration, slows conduction through the atrioventricular (AV) node. It aids in the management of most forms of supraventricular tachycardia and is considered by many to be the drug of choice for treatment of uncomplicated paroxysmal supraventricular tachycardia. In numerous clinical trials intravenous administration of verapamil has been shown in more than 90 percent of cases to convert paroxysmal supraventricular tachycardia to normal sinus rhythm within two minutes following drug administration. Long-term oral administration of verapamil for patients with frequent episodes of paroxysmal supraventricular tachycardia has been shown to decrease both the incidence and the duration of the episodes.

Verapamil therapy rapidly decreases the ventricular response rate to atrial fibrillation or flutter. Ventricular rates begin to slow immediately and maximum drug effect occurs 3½ minutes after drug administration. Therefore, though verapamil rarely converts atrial fibrillation or flutter, it may be quite valuable in the acute management of these dysrhythmias. In recent studies, verapamil given orally appears superior to digoxin administration in reducing resting and exertional heart rates while maintaining exercise tolerance in patients with chronic atrial fibrillation.

Verapamil therapy is not effective in treating supraventricular dysrhythmias that are caused by increased atrial automaticity, such as multifocal atrial tachycardia.

Nor is it helpful in managing sinus tachycardia. It is ineffective in treating ventricular ectopy or tachyarrhythmias. Electrophysiologic studies have shown varying effects on the accessory pathways of patients with Wolff-Parkinson-White syndrome. Reports of increased accessory pathway conduction have resulted in the recommendation that verapamil should not be used in patients with Wolff-Parkinson-White syndrome who have paroxysmal atrial fibrillation or flutter or paroxysmal supraventricular tachycardia with a widened QRS. Nevertheless, it is highly effective in narrow-complex paroxysmal supraventricular tachycardia associated with the Wolff-Parkinson-White syndrome.

Other contraindications to the use of verapamil include sinus node disease; evidence of AV node disease; impaired cardiac contractility (moderate to severe congestive heart failure, particularly when it is not related to a transient increase in heart rate); hypotension, or possible inability to tolerate a transient 10 to 15 mm of mercury drop in systolic blood pressure, and concurrent intravenous use of β -blockers (when given concomitantly these drugs have systematically produced considerable left ventricular dysfunction and on several occasions have resulted in severe AV block leading to asystole).

The incidence of reported severe adverse effects has been less than 1 percent. In a number of instances, however, intravenous verapamil therapy has resulted in hypotension or bradycardia of sufficient magnitude to require pharmacologic interventions. In most of these cases, hypotension has responded to the administration

of norepinephrine or other pressor therapy, and bradycardia has resolved with either atropine or calcium administration.

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Pneumatic Antishock Trousers

THE USE OF DEVICES producing external counterpressure on the lower extremities and abdomen has become widespread since the dissemination of reports documenting their efficacy in controlling hemorrhage and hypovolemic shock during the Vietnam War. Military antishock trousers (MAST) were used most commonly with injuries to the lower extremities, pelvis and abdomen. Many subsequent reports have verified the device's effectiveness in similar types of trauma in civilians. External counterpressure is particularly beneficial in stabilizing patients with pelvic and lower extremity fractures; not only are the fractures splinted, but the bleeding sites about the injured area are tamponaded by the inflated garment, preventing excessive blood loss.

Hypotension due to volume maldistribution, such as in spinal cord trauma, drug effects or dysfunction of the sympathetic nervous system (as in autonomic neuropathies), will also often respond to the application of pneumatic trousers. Recent data suggest as well that abdominal binding, such as that produced by pneumatic trousers, can improve the efficacy of cardiopulmonary resuscitation during external cardiac massage. The probable mechanism for the increase in systolic blood pressure and carotid blood flow seen after MAST application is increased intrathoracic pressure during chest compression due to limitation of diaphragmatic descent by abdominal binding.

External counterpressure produces a number of physiologic effects in addition to tamponade of external and internal bleeding sites located under the garment. These include increased central venous pressure, increased peripheral vascular resistance, mild lactic acidosis (with prolonged inflation), clinically insignificant effects on renal and pulmonary function and increased carotid blood flow. Although "autotransfusion" of about a liter of blood from the lower extremities and abdomen to organs above the diaphragm was once thought to occur, recent data have shown no increase in cardiac output, stroke volume or pulmonary diffusing capacity, corresponding to the earlier findings of Tenney and Honig during ballistocardiography. This suggests that the intravascular transfer produced by the device is minimal, at most only 250 to 300 ml. Mechanisms other than autotransfusion, such as increased afterload produced by compression of vasculature in areas covered by the trousers, are a more likely basis of their effectiveness in the treatment of hypotension.

Contraindications to the use of antishock trousers

include congestive heart failure and pulmonary edema, as increased preload and afterload produced by inflation may worsen these conditions. Pregnant women should not have the abdominal compartment inflated because of risk to the fetus. Use of MAST with injuries or known bleeding sites above the diaphragm remains controversial because redistribution of blood flow to a nontamponaded area may lead to increased blood loss, while circulation to vital organs such as the heart and brain may be increased. Profound hypotension has been seen after rapid deflation of the antishock trousers, probably resulting from reactive vasodilatation in areas previously compressed. Deflation should always be gradual and well monitored, with only one compartment depressurized at a time. In the event of a dramatic fall in blood pressure during deflation, the suit should be reinflated appropriately and fluid infusion continued. If surgical treatment is indicated, deflation of the garment should take place in the operating room only after anesthesia is induced and the surgical team is prepared to operate.

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Overdose Update—Diminishing Drug Absorption

EMERGENCY PHYSICIANS have empirically used a variety of techniques to lessen gastrointestinal absorption of poisons; unfortunately, the efficacy of such techniques has not been subjected until recently to careful analysis. Newer studies should provide us with a more systematic and rational approach to poisoned patients.

General supportive care, combined with attention to and protection of the airway, remains the most critical aspect in the treatment of most cases of poisoning or overdose. Initial efforts at diminishing the total drug burden can be significantly valuable, however. Ipecac-induced emesis removes a greater amount of material than lavage and is preferable unless there is altered mental status or decreased gag reflex. Both are contraindicated in caustic ingestions, and may be inappropriate in hydrocarbon ingestion. Ipecac syrup is virtually nontoxic when used in standard doses. Its use is effective in 95 percent of patients, including those who have overdosed on antiemetics. There is no evidence that emesis is facilitated by having a patient drink large quantities of water; significant dilution may actually encourage greater absorption, as well as moving the drug into the small bowel where it is not amenable to either emesis or lavage. Carbonated beverages apparently do not diminish the effectiveness of ipecac, and in treating children may increase its palatability.

Activated charcoal has been shown in experimental overdose situations to significantly decrease drug con-